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ABSTRACT

The purpose of this study was to determine the relationship between high risk infants' sensorimotor development and their use of intentional communications. Twenty-six 20-month-old infants, selected at birth by use of High Risk Index, were studied. At 15 months of age each infant was administered five scales from the Uzgiris-Hunt Ordinal Scales of Psychological Development. Each infant was then observed at 20 months of age with his/her mother in two standardized settings. In the first setting, which consisted of a play interaction situation between the infant and his/her mother, information was obtained on how the infant communicates intentionally to his/her mother using the "showing" function of communication. The "showing" function of communication was measured by the infant's use of nonverbal behavior (pointing, showing off), vocalization and actual words to obtain the mother's attention. In the second setting which consisted of the administration of an experimental task to the infant, again with the mother present, information was obtained on how the infant communicates using the "requesting" function of communication. The "requesting" function of communication consisted of commands or requests by the infant to the mother or experimenter in order to attain an object or to require the mother or the experimenter to act in some way. Results indicated that measures of the "showing" function were significantly related to only one of the Uzgiris-Hunt Scales -- the object permanence scale. Measures of the "requesting" function were significantly related to two of the Uzgiris-Hunt scales -- the vocal imitation scale and the object schemes scale. It is concluded that this study does not provide strong, consistent evidence to support the notion of a relationship between infants' cognition and language. (Author/MP)

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THE RELATIONSHIP BETWEEN SENSORIMOTOR BEHAVIORS AND LANGUAGE IN SOCIOECONOMICALLY DEPRESSED INFANTS

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THE RELATIONSHIP BETWEEN SENSORIMOTOR BEHAVIORS AND LANGUAGE IN SOCIOECONOMICALLY DEPRESSED INFANTS[1]

Joanne Curry O'Connell and Dale C. Farran

Many recent studies of early communications have focused on the nonlinguistic factors that serve as prerequisites to the development of intentional communications. These nonlinguistic factors include social developments--such as mutual play between the mother and her infant, the type of input--such as mother talk, but most of all, the cognitive prerequisites. Several recent studies have supported the notion of cognitive prerequisites to early language development by presenting evidence of a positive correlation between sensorimotor development, generally as measured by various scales of the Uzgiris-Hunt Ordinal Scales of Psychological Development, and the development of language, as measured by the child's ability to name objects or an experimental task designed to measure the use of intentional communicative behaviors. Menyuk (1979) states that an understanding of the relationship between language and cognitive development is vital if we are to determine how and when to intervene with handicapped children. An empirical model for determining the cognition-language relationship has been espoused by Bates (1979) and requires evidence of a strong positive correlation between behaviors representing the two domains if one is to support either the prerequisite nature of cognition or the notion of shared origins, or "software" as Bates terms it. The present study addresses the issue of the cognition-language relationship by observing early communicative behaviors in a group of 20-month old infants whose socioeconomic status placed them at risk for mental retardation.

Subjects and Procedures

The subjects were 26 infants participating in the Frank Porter Graham Child Development Center Carolina Abecedarian Project. The infants were selected at

birth by use of a High Risk Index constructed by Abecedarian investigators. This index results in the selection of families whose socioeconomic characteristics have been shown to place their children at high risk for failure in public schools. The High Risk Index includes such factors as parental education, parental income and maternal IQ. The average IQ of the mothers in this group of infants was 85.

Five scales from the Uzgiris-Hunt Ordinal Scales of Psychological Development (1975) were administered to each infant at 15 months of age by a trained psychologist. Each infant was then observed at 20 months of age individually with his or her mother in two standardized settings. The first setting consisted of a free play interaction situation between the infant and his or her mother in order to obtain information on the infant's intentional use of the "showing" function of communications. The second setting consisted of the administration of an experimental task by the experimenter to the infant with the mother present, in order to obtain information on the infant's intentional use of the "requesting" function of communication.

The setting for both observational procedures was a room furnished like a living room. The room contained two video cameras and two microphones. Mothers and their infants were brought into the room and told that we were interested in how children play with their mothers and that they were to use the next 20 minutes of free time at home. From this free play interaction session we obtained information on how the infant used nonverbal behaviors, vocalizations and words to communicate intentionally to their mother using the "showing" function of communications. That is, whenever the infant obtained the mother's attention by showing, giving something to her, vocalizing to her, or talking, the communicative attempt was categorized into one of four developmentally based categories, as described by Snyder (1975).

The four categories of intentional communications under the "showing" function in developmental order were the following:

1. Showing off. This behavior was coded when the infant performed or acted in such a manner as to obtain the mother's attention by using his own behavior as the focus of attention and resulted in the mother smiling or laughing.
2. Giving, showing and/or pointing. This behavior was coded when the infant used an object to extend to the mother in order to get the mother's attention. This was most often accompanied by a simultaneous vocalization and looking at the mother's face or hands. The mothers most often attended to the object by providing the appropriate linguistic label for the object.
3. Ritualized signal. This behavior was coded whenever the infant first intentionally obtained the mother's attention, by looking at the mother and vocalizing, or by going over to the mother and tapping her leg, and then, bringing the mother's attention to the object.
4. Linguistic symbol. This category was coded when the infant used a linguistic symbol to communicate with the mother in order to get the mother to attend to the object of interest. This category of behavior also involved looking at the mother and pointing to or giving the object to the mother. It is differentiated from the other categories by the fact that the infant used an actual linguistic symbol, as opposed to a vocalization.

A measure of the proportion of intentional communicative attempts within each category was obtained for each infant.

The second procedure, the experimental communication task, was similar to one used by Snyder (1975). The procedure for this task consisted of placing the infant

in a position such that he would be more likely to request adult assistance in obtaining the stimulus items presented. The infant was placed at a semi-circular table in a small chair. The experimenter presented two "warm-up" stimulus items to the infant in order to develop rapport and establish a "set" with the infant that encouraged his interaction with stimulus materials.

After the warm-up period, ten stimulus items were presented, one at a time, to the infant. The item was placed on the small table out of the infant's reach. The experimenter brought the attention of the infant to the item and then responded to any attempt by the infant to communicate the desire for the adult to give him the item. Attempts made by the infant to obtain the item through the mother were acceptable and scored.

The request function of communication consisted of commands or requests by the infant to the mother or experimenter in order to attain an object or require the mother or experimenter to act. As with the "showing" function, the "requesting" function categories of intentional communications were devised to be consistent with the developmental progression of behaviors identified with this function by Snyder (1975). They consisted of the following four categories:

1. Fussing and reaching for the object. This category of behavior was coded whenever the infant obviously wanted an object, attempted to get it and was unsuccessful, but did not communicate to the mother or experimenter for help.
2. Reaching for an object, then looking at the experimenter. This category was coded whenever the infant reached for an object, fussed or vocalized, then turned to the experimenter or mother--looking at her or at her hand--while vocalizing. This category was characterized by the infant's recognition that the mother could be the means for obtaining the desired goal.

3. Ritualized signal. This category is similar to the third category of the "showing" function, only the infant's intentions are to request assistance of the mother. This category was coded when the infant first obtained the attention of the mother or the experimenter, and then, made a request by fussing and pointing. The infant could obtain the experimenter's attention by touching her hand or tapping her as she was looking away, or could immediately turn to the mother at the sight of the stimulus item.
4. Linguistic symbol. This category was coded whenever the infant used a word that indicated a request or command. The linguistic symbol was most often accompanied with looking behavior at the mother or experimenter and pointing to the object.

Again a measure of the proportion of intentional communicative attempts within each category was obtained for each infant.

Because of the idiosyncratic nature of the mother-infant dyad interactions, a random 5 minute sample from each tape was coded by two independent observers. A 100% agreement level was obtained before proceeding to code the rest of the tape.

Results

Two different analyses were conducted. First, in order to determine whether or not group differences would emerge on the two communicative measures between infants who were at Stage 6 on the Uzgiris-Hunt measure and those below Stage 6, a two-group comparison was conducted. The number of infants in each group for each subscale is shown in Table 1. No infant was at Stage 6 on the object permanence scale at 15 months. The subscales where the majority of infants were functioning at Stage 6 were gestural imitation, operational causality and schemes for relating to objects.

Three of the scales had a sufficient number of infants (6 or more) in both groups to conduct a two-group comparative analysis. Using as the dependent

variable the mean proportion of communicative behaviors at the highest level of communication, there were no significant differences for either the "show" or "request" function. That is, the level of sensorimotor development did not differentiate the infants in terms of their use of a more sophisticated level of communication five months later. These results are shown in Table 2.

The second analysis consisted of obtaining Pearson product moment correlations between the proportion of the most sophisticated communicative level used and the highest scale step passed for each scale, regardless of whether Stage 6 was achieved. Again measures of both the "showing" function and the "requesting" function were used. A summary of the correlations by scale and function are presented in Table 3.

The measure of sensorimotor development did not consistently relate to measures of communicative development. Measures of the "showing" function were significantly related to only one scale, the object permanence scale. No other scale was found to be statistically related to the measure of the "showing" function. For the "request" function, two scales were found to be statistically significant--vocal imitation and object schemes.

Discussion

The purpose of this study was to determine the relationship between high risk infants' sensorimotor development and their use of intentional communications. As the results indicate, this study does not provide strong, consistent evidence to support the notion of a relationship between cognition and language that would suggest either a shared, underlying structure or direct causation according to the empirical models that have been suggested by Bates.

Additional studies are necessary in order to determine the relationship between cognition and language. However, there are a number of recent studies that have

addressed this controversy and present several methodological problems that need to be considered before we can say with any certainty what this relationship is. First of all, most studies have used the Uzgiris-Hunt Scales as a measure of sensorimotor development. This provides us with a consistent tool for assessing the infants' developmental status. However, the second revision of this instrument resulted in the abandonment of any quantification and scaling in terms of Piaget's six stages (Uzgiris & Hunt, 1975). It is therefore left up to the individual investigator to delineate the scale step and critical infant action that coincides with Piaget's stages. This may cause some variance in the determination of our identification of stage attainment, which could drastically alter the results. This information is typically not reported.

One other serious consideration in the use of the Uzgiris-Hunt Scales is that the tasks for measuring different components of sensorimotor development are very similar to the tasks used to measure communications. Only one study addressed this issue (Harding and Golinkoff, 1979) and devised an alternate task.

The second major methodological concern is in the definition and assessment of intentional communicative behaviors. The experimental task developed by Snyder and used in this study provides limited consistency across reported studies, but since there are no standard procedures for administration and scoring, much variance will occur. Several studies I reviewed use completely different types of measures for language, such as size of lexicon.

These methodological questions point out some of the limitations of this study as well as other reported in recent literature concerned with the relationship between cognition and language. Continued research is needed, but we may need to consider seriously the position espoused by Menyuk (1979). That is, she suggests that the acquisition of linguistic and nonlinguistic structures may be initially independent and merge at the time when children acquire lexical items and basic relations. This indeed would provide quite a different direction for intervention.

FOOTNOTE

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TABLE 1

Number of Infants At Stage 6 or Below Stage 6
on Five Uzgiris-Hunt Sensorimotor Scales

Scale	Below Stage 6	At or Above Stage 6
Object Permanence	26	0
Developing Means to an End	17	9
Vocal Imitation	24	2
Gestural Imitation	6	20
Causality	9	17
Object Schemas	2	24

TABLE 2

Summary of Two-Group Comparisons of Infants
At Stage 6 or Below Stage 6 on Uzgiris-Hunt
Sensorimotor Scales and Proportion of the Highest
Communicative Levels of the "Show" and "Request" Function

Scale	Show Function		Request Function	
	t	p	t	p
Object Permanence	*		*	
Means-End	-.01	.99	.23	.82
Vocal Imitation	*		*	
Gestural Imitation	1.85	.10	1.14	.29
Causality	1.08	.30	.45	.66
Object Schemes	*		*	

*Insufficient numbers of infants in both groups to conduct analysis.

TABLE 3

Correlations Between Sensorimotor Scales of Intelligence and Communicative Level of "Show" and "Request" Functions

Scale	Show Function		Request Function	
	r	p	r	p
Object Permanence	.41	.05	.10	.63
Means-End Relations	-.003	.99	.08	.70
Vocal Imitation	.19	.38	.55	.003
Gestural Imitation	.40	.06	.31	.13
Causality	.31	.15	.25	.21
Object Schemes	.17	.45	.52	.007